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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,245	02/09/2004	Yasuharu Sasaki	248707US2	7165

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER
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DHINGRA, RAKESH KUMAR

ART UNIT	PAPER NUMBER
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1763

NOTIFICATION DATE	DELIVERY MODE
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09/14/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

Application No.

10/773,245

Applicant(s)

SASAKI ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-7,10,12,13 and 15-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7,10,12,13 and 15-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/11/07 has been entered.

***Terminal Disclaimer***

The terminal disclaimer filed on 7/11/07 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of application number 10/722,602 has been reviewed and is accepted. The terminal disclaimer has been recorded.

In view of above, the double patenting rejection of claims 1, 5, 10, 12, 13, 15-25 is withdrawn.

***Response to Arguments***

Applicant's arguments with respect to claims 1-8, 10, 12, 13, 15-25, 46 and 47 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended independent claims 1, 5 by adding new limitations (for example in claim 1 – “a top surface of the ring member being substantially flush with a top surface of the to-be-treated substrate” and “ along a diameter direction thereof” and “the dc voltages applied to the electrodes being adjusted independently from each other”. Further, applicant has also cancelled 4, 8, 11, 14 and 26-47.

**According claims 1-3, 5-7, 10, 12-13 and 15-25 are now pending and active.**

New references (US Patent No. 6,726,799 - Koike) when combined with Selwyn et al reads on amended claims 1, 5 limitations. Accordingly claims 1, 5 have been rejected under 35 USC 103 (a) as explained below. Further, remaining claims 2, 3, 6, 7, 10, 12, 13 and 15-25 have also been rejected under 35 USC 103 (a) as explained below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Selwyn et al (US Patent No. 5,716,486) in view of Koike (US Patent No. 6,726,799).**

Regarding Claims 1, 5: Selwyn et al teach a plasma processing apparatus (for example, Figures 9, 12-15, 18, 19) for performing a processing on a to-be- treated substrate 22 mounted on a mounting table 20 in a processing vessel by plasma of a processing gas comprising:

a focus ring 125 installed to surround the to-be- treated substrate 22 on the electrode assembly 20 and spaced apart from an outer periphery of the substrate 22;

an electrode embedded in the focus ring member 125 along a circumferential direction; and,

a DC power supply 39 for applying a DC voltage to the electrode to adjust plasma sheath. Selwyn et al also teach that such electrodes if embedded within the lower electrode 20 also provide similar control

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over plasma configuration and more than one electrodes 80, 84 (plurality of electrodes) can be embedded and their relative position enables control of the plasma configuration. Selwyn et al additionally teach plural electrodes 90 along a diameter direction and that these can be powered by independent power supplies 92a, 92b whose potential can be regulated (independently controlled) by a controller 96 as per plasma process limitations. It would be obvious to use plurality of electrodes embedded in the focus ring along a diameter direction and supplied with independently controlled dc power in view of teachings of Selwyn et al for compensating plasma non-uniformities as per process limitations [for example, column 6, line 15 to column 10, line 30]. Further,

Selwyn et al do not teach focus ring formed of an insulating materials and top surface of focus ring being substantially flush with a top surface of the to-be-treated substrate.

Koike teaches a plasma apparatus (Figure 1) comprising a plasma processing chamber 1 with a lower electrode 2 for supporting a substrate 3 and a focus ring 4 surrounding the substrate 3. Koike further teaches that focus ring is made from an insulating material. Koike also teaches that etching rate at the circumference of wafer depends upon the height of focus ring, and therefore its height is adjusted (as a result effective variable) to obtain an improved process margin during plasma etching (column 1, lines 10-30 and column 2, line 15 to column 3, line 65). Thus it would be obvious to optimize the height of focus ring (with respect to height of wafer) to maintain plasma uniformity with variation in plasma processing conditions like gas flow rate, RF power level, gas pressure etc.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to optimize the height of focus ring as taught by Koike in the apparatus of Selwyn et al to obtain improved process margin during plasma processing.

Regarding Claims 2, 6: Selwyn et al teach that controller 96 enables supplying controlled DC voltages to plurality of embedded electrodes 90, as per plasma process limitations (Figures 13, 13a and column 8, lines 27-50).

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Regarding Claims 3, 7: Selwyn et al in view of Koike teach all structural limitations of the claim (as explained above under claims 1, 2). Claim limitations pertaining to use of apparatus for etching thin films of different thicknesses are intended use limitations and the apparatus of prior art is considered capable of meeting the same.

In this regards courts have ruled (Case law):

“A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).”

**Claims 10, 13, 16-18, 21, 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Selwyn et al (US Patent No. 5,716,486) in view of Koike (US Patent No. 6,726,799) as applied to Claim 1-3, 5-7 and further in view of O'Donnell et al (US PG PUB No. 2005/015,0866) and Fakuda et al (US PG PUB No. 2003/0113479).**

Regarding Claim 10: Selwyn et al in view of Koike teach all limitations of the claim (as already explained above) except a film formed on the focus ring and sealing of film by resin.

O'Donnell et al teach an apparatus (Figures 4-6) that includes a focus ring 14 and comprising:  
aluminum (base material); and

a film (layer 100) formed by thermal spraying of yttria-containing coating (ceramic) [Paragraphs 0041, 0054, 0057, 0059, 0062-0066].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use focus ring with ceramic coating as taught by O'Donnell et al in the apparatus of Selwyn et al in view of Koike to provide improved wear resistance to physical and /or chemical attack in plasma environment (paragraph 0010).

Selwyn et al in view of Koike and O'Donnell et al do not teach at least a portion of thermally sprayed film is sealed by a resin.

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Fakuda et al teach a plasma treatment apparatus (Figure 1) that includes internal members 3a, 3b, 7 that are coated with dielectric layers (thermally sprayed ceramic layers) 4a, 4b, 6. Fakuda et al further teach that a sealing treatment is carried out on top of dielectric layer to reduce the void volume of the dielectric coating [Paragraphs 0067- 0080].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to seal the thermally sprayed film by resin as taught by Fakuda et al in the apparatus of Selwyn et al in view of Koike and O'Donnell et al to reduce void volume of barrier coating (paragraph 0080).

Regarding Claims 13, 21: Fakuda et al teach that thermally sprayed ceramic layer is sealed through sol-gel method (Paragraphs 0098, 0099).

Regarding Claim 16: O'Donnell et al teach that main layer is formed of Yttria (Y<sub>2</sub>O<sub>3</sub>) {Paragraph 0041}.

Regarding Claims 17, 18: O'Donnell et al teach (Figures 4-6) that focus ring 14 comprises aluminum (base material), and a film formed on a surface of the base material, wherein the film has a main layer 100 formed by thermal spraying of yttria-containing coating (ceramic) and an intermediate coating (barrier coat layer) 80 formed of Al<sub>2</sub>O<sub>3</sub> (ceramic) [Paragraphs 0041, 0059, 0062-0066].

Regarding Claims 23, 24: Selwyn et al in view of Koike and O'Donnell et al teach all limitations of the claim including that intermediate coating (barrier coat layer) 80 can be formed of polymers like polyimides and polytetrafluoroethylene (PTFE) {engineering plastics} [O'Donnell et al - paragraph 0065].

Regarding Claim 25: O'Donnell et al teach that main layer 100 is formed of Yttria (Y<sub>2</sub>O<sub>3</sub>) [0062].

**Claims 12, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Selwyn et al (US Patent No. 5,716,486) in view of in view of Koike (US Patent No. 6,726,799), O'Donnell et al (US PG PUB No. 2005/015,0866) and Fakuda et al (US PG PUB No. 2003/0113479) as applied to**

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**(US PG PUB No. 2005/015,0866) and Fakuda et al (US PG PUB No. 2003/0113479) as applied to Claims 10, 13, 16-18, 21, 23-25 and further in view of George et al (US patent No. 4,357,387).**

Regarding Claims 12, 19, 20: Selwyn et al in view of Koike, O'Donnell et al and Fakuda et al teach all limitations of the claim including barrier coat layer is thermally sprayed film and also teach sealing of thermally sprayed film using a resin.

Selwyn et al in view of Koike, O'Donnell et al and Fakuda et al do not teach resin is selected from the group consisting of SI, PTFE, PI, PAI, PEI, PBI and PFA.

George et al teach sealing of thermally sprayed refractory (includes ceramic) coating using resins to improve surface abrasion and durability of coatings. George et al further teach that sealing resin can be polyimide resin, polyamideimide resin etc (Column 2, lines 55-65 and Column 7, lines 10-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to seal the thermally coated film using resin as taught by George et al in the apparatus of Selwyn et al in view of Koike, O'Donnell et al and Fakuda et al to improve its durability against surface abrasion.

**Claims 15, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Selwyn et al (US Patent No. 5,716,486) in view of in view of Koike (US Patent No. 6,726,799), O'Donnell et al (US PG PUB No. 2005/015,0866) and Fakuda et al (US PG PUB No. 2003/0113479) as applied to Claims 10, 13, 16-18, 21, 23-25 and further in view of Panitz et al (US Patent No. 5,925,228).**

Regarding Claims 15, 22: Selwyn et al in view of Koike, O'Donnell et al and Fakuda et al teach all limitations of the claim except that sealing treatment uses a group 3a element.

Panitz et al teach an apparatus (Figures 1, 2A-2C) where a  $Al_2O_3 - SiO_2$  (Al is an element from group 3a) solution is used for sol-gel sealing treatment of porous coatings on metallic substrates to control pore size and density of ceramic coatings on the substrate (Column 3, line 5 to Column 4, line 40).



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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use group 3a element for sealing of coating as taught by Panitz et al in the apparatus of Selwyn et al in view of Koike, O'Donnell et al and Fakuda et al to control pore size and density of ceramic coatings on metal substrates.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh K. Dhingra



Karla Moore  
Primary Examiner  
Art Unit 1763